CLAIMS:

1. Sample mixing structure on a sample processing device, the sample mixing structure comprising:

5   a process chamber comprising a delivery port on a proximal side of the process chamber and an exit port on a distal side of the process chamber;

     a mixing chamber comprising a mixing port, wherein the mixing port is located on the distal side of the process chamber;

     wherein rotation of the sample processing device about an axis of rotation moves at

10 least a portion of sample material in the processing chamber into the mixing chamber through the mixing port when the mixing port is open, wherein the proximal side of the process chamber is located closer to the axis of rotation than the distal side of the process chamber;

     and wherein, when the exit port of the process chamber is open, rotation of the

15 sample processing device about the axis of rotation moves the sample material out of the process chamber and the mixing chamber.

2. A device according to claim 1, wherein the exit port of the process chamber is closed.

20

3. A device according to claim 1, wherein a radial axis extends through the proximal side and the distal side of the process chamber.

4. A device according to claim 3, wherein the radial axis intersects the axis of

25 rotation, and wherein the radial axis extends through the delivery port and the exit port of the process chamber.

5. A device according to claim 1, wherein at least a portion of the mixing chamber is located in a tangential direction off to a side of the process chamber relative to the radial

30 axis.

6.   A device according to claim 1, wherein the process chamber is located between a first major side and a second major side of the sample processing device, wherein at least a portion of the mixing chamber is located between the process chamber and the second major side of the sample processing device.

7.   A device according to claim 6, wherein substantially all of the mixing chamber is located between the process chamber and the second major side of the sample processing device.

8.   A device according to claim 1, wherein the mixing port comprises a valve, and wherein the valve of the mixing port is closed.

9.   A device according to claim 1, further comprising a reagent in the mixing chamber.

10.   Sample mixing structure on a sample processing device, the sample mixing structure comprising:

a process chamber comprising a delivery port on a proximal side of the process chamber and an exit port on a distal side of the process chamber, wherein the exit port is closed; and

a mixing chamber comprising a mixing port, wherein the mixing port is located on the distal side of the process chamber;

wherein the process chamber is located between a first major side and a second major side of the sample processing device, wherein at least a portion of the mixing chamber is located between the process chamber and the second major side of the sample processing device;

wherein rotation of the sample processing device about an axis of rotation moves at least a portion of sample material in the processing chamber into the mixing chamber through the mixing port when the mixing port is open, wherein the proximal side of the process chamber is located closer to the axis of rotation than the distal side of the process chamber;

and wherein, when the exit port of the process chamber is open, rotation of the sample processing device about the axis of rotation moves the sample material out of the process chamber and the mixing chamber.

5   11.   Sample mixing structure on a sample processing device, the sample mixing structure comprising:

     a process chamber comprising a delivery port on a proximal side of the process chamber and an exit port on a distal side of the process chamber;

     a first mixing chamber in fluid communication with the process chamber through a

10   first mixing port, wherein the first mixing port is located on the distal side of the process chamber;

     a second mixing chamber in fluid communication with the process chamber through a second mixing port, wherein the second mixing port is located on the distal side of the process chamber;

15   wherein rotation of the sample processing device about an axis of rotation moves at least a portion of sample material in the processing chamber into at least one of the first mixing chamber and the second mixing chamber, wherein the proximal side of the process chamber is located closer to the axis of rotation than the distal side of the process chamber;

20   and wherein, when the exit port of the process chamber is open, rotation of the sample processing device about the axis of rotation moves the sample material out of the first mixing chamber, the second mixing chamber, and the process chamber.

     12.   A device according to claim 11, wherein the exit port of the process chamber is

25   closed.

     13.   A device according to claim 11, wherein a radial axis extends through the proximal side and the distal side of the process chamber.

30   14.   A device according to claim 13, wherein the radial axis intersects the axis of rotation, and wherein the radial axis extends through the delivery port and the exit port of the process chamber.

15.   A device according to claim 13, wherein the first mixing chamber and the second mixing chamber are symmetric about the radial axis.

16.   A device according to claim 11, wherein at least a portion of the first mixing chamber is located in a tangential direction off to a first side of the process chamber relative to the radial axis, and wherein at least a portion of the second mixing chamber is located in a tangential direction off to a second side of the process chamber relative to the radial axis.

17.   A device according to claim 11, wherein the process chamber is located between a first major side and a second major side of the sample processing device, wherein at least a portion of the first mixing chamber and at least a portion of the second mixing chamber are located between the process chamber and the second major side of the sample processing device.

18.   A device according to claim 11, wherein the process chamber is located between a first major side and a second major side of the sample processing device, wherein substantially all of the first mixing chamber and substantially all of the second mixing chamber are located between the process chamber and the second major side of the sample processing device.

19.   A device according to claim 11, wherein the first mixing port comprises a valve, and wherein the valve of the first mixing port is closed.

20.   A device according to claim 11, further comprising a reagent in the mixing chamber.

21.   A method of mixing fluids in a sample processing device, the method comprising:
        providing a sample processing device comprising a process chamber, at least one mixing chamber, and at least one mixing port located on a distal side of the process chamber;

16

providing sample material in the process chamber;

rotating the sample processing device about an axis of rotation, wherein at least a portion of sample material in the processing chamber moves into the at least one mixing chamber through the at least one mixing port when rotating the sample processing device, wherein the rotating comprises at least one acceleration and deceleration cycle.

22.   A method according to claim 21, wherein the rotating comprises two or more acceleration and deceleration cycles.

23.   A method according to claim 21, wherein the at least one mixing port is closed and the method further comprises opening the at least one mixing port such that the process chamber and the at least one mixing chamber are in fluid communication before the rotating.

24.   A method according to claim 21, wherein the process chamber comprises a reagent.

25.   A method according to claim 21, wherein the at least one mixing chamber comprises a reagent.

26.   A method according to claim 21, wherein the at least one mixing chamber comprises two or more mixing chambers, wherein each mixing chamber of the two or more mixing chambers comprises one mixing port of the at least one mixing port.

27.   A method according to claim 21, wherein the process chamber comprises an exit port, and wherein the method further comprises opening the exit port after rotating the sample processing device to move at least a portion of sample material in the processing chamber moves into the mixing chamber through the mixing port.

28.   A method according to claim 27, further comprising rotating the sample processing device about the axis of rotation to remove at least a portion of the sample material from the process chamber through the exit port.

17

29.   A method of mixing fluids in a sample processing device, the method comprising:

providing a sample processing device comprising a process chamber, at least one mixing chamber, and at least one mixing port located on a distal side of the process chamber;

providing sample material in the process chamber;

rotating the sample processing device about an axis of rotation, wherein at least a portion of sample material in the processing chamber moves into the at least one mixing chamber through the at least one mixing port when rotating the sample processing device, wherein the rotating comprises two or more acceleration and deceleration cycles;

opening an exit port in the process chamber after rotating the sample processing device to move at least a portion of sample material in the processing chamber moves into the at least one mixing chamber; and

removing at least a portion of the sample material from the process chamber through the exit port by rotating the sample processing device about the axis of rotation.